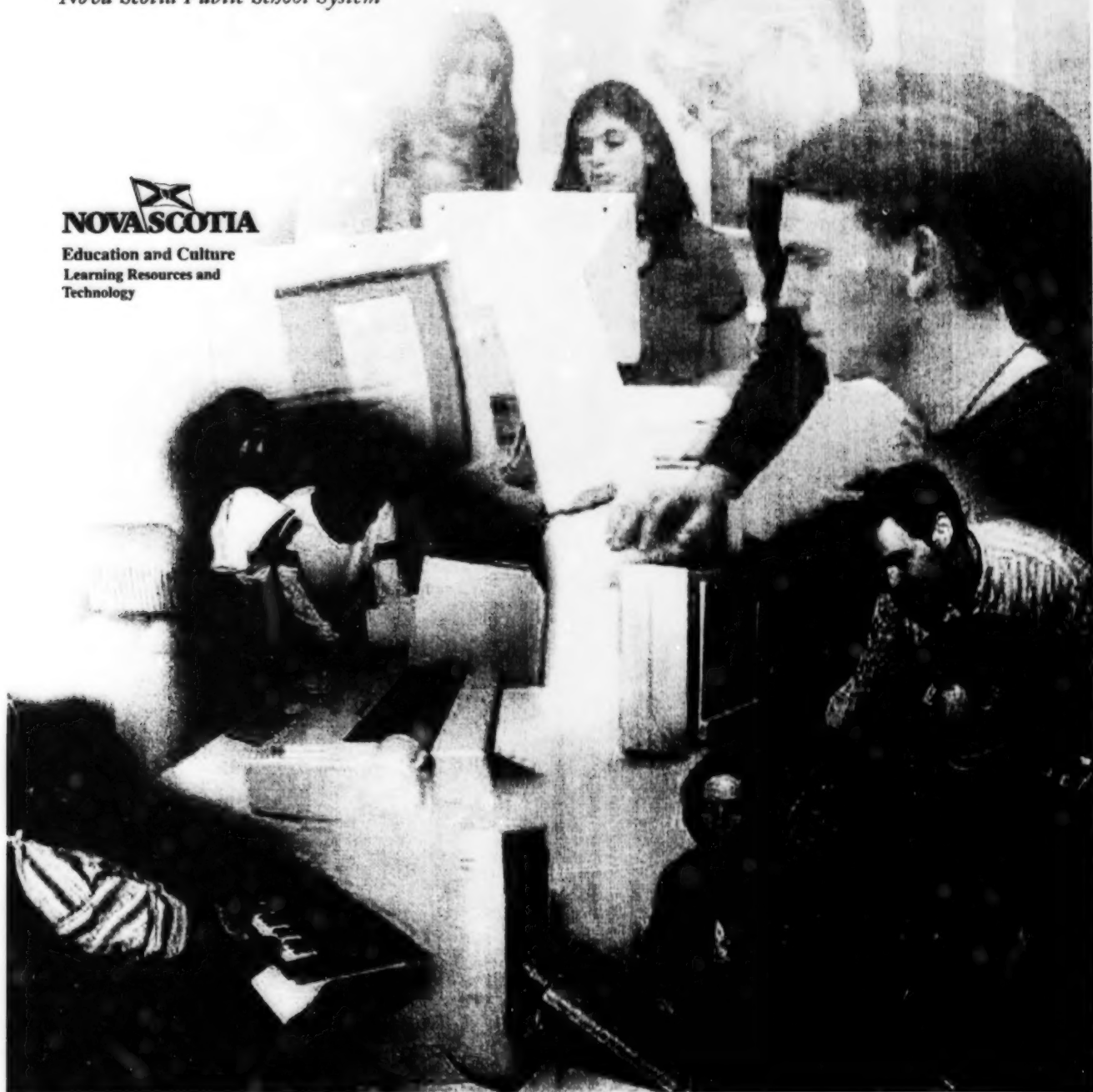


**VISION  
FOR THE INTEGRATION OF  
INFORMATION  
TECHNOLOGIES**

*within the  
Nova Scotia Public School System*

  
**NOVA SCOTIA**  
Education and Culture  
Learning Resources and  
Technology



**VISION  
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Prepared by the Department of Education and Culture

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## Table of Contents

### **Introduction**

Vision .....	1
Rationale .....	1
Meeting the Needs of All Students .....	2
Why Use Information Technology? .....	4
Expected Results .....	4
Context .....	5
Learning Outcomes Framework .....	7

### **Key-Stage Outcomes for the Integration of Information Technology within the Public School Program**

Basic Operations and Concepts .....	8
Productivity Tools and Software .....	10
Communications Technology .....	12
Research, Problem Solving and Decision Making .....	14
Social, Ethical and Human Issues .....	17

<b>Illustrative Examples of Key-Stage Outcomes</b> .....	<b>19</b>
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## Purpose of this Document

This document provides the foundation for the integration of information technology within the public school system.

## Vision

Throughout history, technology has played a pivotal role in human life. People originate technologies—methods, processes and inventions—as ways of dealing with problems and needs. Technology evolves with the demands of the moment and reflects the power and philosophy of its creators and users.

By its very nature, technology changes how people perceive a task or problem and how they deal with it. In general, technology also contributes to environmental, cultural, social and economic change. Information Technology (IT) is simply one of the most powerful technologies of many that have emerged.

IT refers to the tools that have emerged and are evolving to create, store, retrieve and disseminate information, using a variety of media, amongst them computer-based media; data and information systems; interactive telecommunications systems, curriculum software; and some forms of assistive technology. IT also includes calculators, audio and video recordings and broadcasts; still images; and projections.

IT is properly deployed in education to support, sustain and improve learning. Learning, in turn, sustains Nova Scotians as we develop culturally and economically. Our ability to understand, manage and integrate IT directly affects the quality of our lives and culture. The application of IT is helping Nova Scotians become global citizens faster than ever; through its influence, Nova Scotian learners have the opportunity to use and augment human knowledge faster and more completely as they become more at home in the global community.

## Rationale

Information Technology is evolving at an exponential rate. Never before has humankind had such a wealth of data and information at its fingertips. Never before has it been so possible to manipulate, shape, and analyse such information. In so far as access to and use of IT is equitable, and while our pedagogical focus is the construction of meaning, educators are poised, as never before, to support students in learning experiences which provide them the opportunities to shape and sustain their lives in meaningful ways that are personally meaningful.

IT used for educational purposes in Nova Scotia should be selected on the basis of

- beliefs about learning held generally by the Nova Scotian educational community
- current learning theory
- affordability of the technologies
- its educational value in relation to its cost
- equity of learner access
- the acceptance of the technology in various learning contexts

The educational use of IT best improves learning when those technologies are accessible, flexible, responsive, participatory, and integrated thoroughly into all public school programs.

This vision is concerned with enabling students to achieve essential graduation learnings and curriculum outcomes through the selection and integration of appropriate information technologies within the public school program. To realize this vision, all students and teachers must have ongoing access to appropriate IT within the classroom and school library or media centre to support their work.

Classes such as Technology Education, Business Education and Computer Related Studies will provide learning experiences which some learners may select to explore more fully specific technologies.

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Students have many ways of learning, understanding, and creating meaning. Noted educational researcher Howard Gardner, for example, identifies seven broad frames of mind, or intelligences: linguistic; logical/mathematical; visual/spatial; body/kinesthetic; musical; interpersonal; and intrapersonal. Other researchers and education psychologists use different models to describe and organize learning preferences. Learning activities and resources which engage these multiple ways of understanding allow more students to develop their learning more fully, not just retain and reproduce a specific body of knowledge.

As educators, we seek effective ways to support the learning of students from varying cultural contexts and with diverse needs, interests, abilities, and learning styles. We strive to apply democratic principles and encourage social justice within our public education system. We work to meet the needs of all students.

The integration of information technology within the public school program allows teachers and students to create and employ novel, alternative ways of achieving learning outcomes. For some students, IT provides access to previously inaccessible curriculum. IT affords all learners sophisticated, cross-curricular learning opportunities through the changes in pedagogy and access to rich information which IT can bring.

### **Meeting the Needs of All Students**

Information technology should be integrated within inclusive classrooms, where a wide variety of learning experiences ensure that all learners have equitable opportunities to reach their potential.

In designing learning experiences for students, teachers must allow for the learning needs, preferences, and strengths of individuals, and consider the experiences, interests, and values which they bring to the classroom.

In recognizing and valuing the diversity of students, teachers should consider ways to

- create a climate and design learning experiences to affirm the dignity and worth of all learners in the classroom community
- redress educational disadvantage—for example, as it relates to students living in poverty
- acknowledge racial and cultural uniqueness
- model the use of inclusive language, attitudes, and actions supportive of all learners
- adapt classroom organization, teaching strategies, assessment practices, time, and learning resources to address learners' needs and build on their strengths
- provide opportunities for learners to work in a variety of contexts, including mixed-ability groupings
- identify and utilize strategies and resources that respect the range of students' learning styles and preferences
- build on students' individual levels of knowledge, skills and attitudes
- design learning and assessment tasks that draw on learners' strengths
- use students' strengths and abilities to motivate and support their learning
- provide opportunities for students to comfortably make choices that will broaden their access to a range of learning experiences
- acknowledge the accomplishment of learning tasks, especially those that learners believed were too challenging for them

In a supportive learning environment all students receive equitable access to resources, including the teacher's time and attention, technology, learning assistance, a range of roles in group activities, and choices of learning experiences when options are available. All students are disadvantaged when oral, written, and visual language creates, reflects and reinforces stereotyping.

Teachers promote social, cultural, racial, and gender equity when they provide opportunities for students to critically examine the texts, contexts, and environments in the classroom, in the community and in the media.



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Teachers should look for opportunities to

- promote critical thinking
- recognize knowledge as socially constructed
- model gender-fair language and respectful listening in all their interactions with students
- articulate equally high expectations for all students
- provide equal opportunity for input and response from all students
- encourage all students to assume leadership roles
- ensure that all students have a broad range of choice in learning and assessment tasks
- encourage all students to avoid making decisions about roles and language choices based on stereotyping
- include the experiences and perceptions of all students in all aspects of their learning
- recognize the contributions of men and women of all social, cultural, linguistic and racial backgrounds to all disciplines throughout history

Social and cultural diversity expands and enriches the learning experiences of all students. Students can learn much from the backgrounds, experiences, and perspectives of their classmates. In a community of learners, participants explore the diversity of their own and others' customs, histories, values, beliefs, languages and ways of seeing and making sense of the world. When learning experiences are structured to allow for a variety of perspectives, students from different social and cultural backgrounds realize that their ways of seeing and knowing are not the only ones possible. They can come to examine more carefully the complexity of ideas and issues arising from the differences in their perspectives and understand how cultural and social diversity enrich their lives and their culture.

The outcomes designed in this document provide a framework for a range of learning experiences for all students. Teachers must adapt learning contexts to provide support and challenge for all students, using learning outcomes in a flexible way to plan learning experiences appropriate to students' individual learning needs. When these changes are not sufficient for a student to meet designated outcomes, an individual program plan is developed, (see "The Special Education Policy Manual", 1998, policy 2.6).

A range of learning experiences, teaching and learning strategies, motivation, resources, and environments

provide expanded opportunities for all learners to experience success as they work toward the achievement of designated outcomes. Many of the learning experiences suggested in this document provide access for a wide range of learners, simultaneously emphasizing both group support and individual activity. Similarly, a variety of assessment practices provide multiple ways for students to demonstrate their achievements.



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## Why Use Information Technology?

When used properly, IT

- facilitates students' communication, problem solving, decision making, and expression
- helps students to manipulate information so as to discover patterns and relationships and construct meaning
- helps students formulate, in the pursuit of knowledge, both conclusions and complex questions for further research
- permits students and teachers more immediately to access and share current learning content and information
- provides students with special needs fuller access to their learning environment
- allows Nova Scotians to develop and maintain competitive advantages in the global information economy

## Expected Results

What should Nova Scotians observe to determine the success of public investment in this vision for the integration of IT within public school programs?

As the result of this project, the following educational benefits will be realized.

- Students will acquire the knowledge, skills, and attitudes regarding information technology they require for the workplace and to pursue advanced studies.
- Students and teachers will use IT effectively to solve problems and support cross-disciplinary learning and those who require it will have access to assistive technology to increase their active participation in public school programs.
- Students in small rural schools will get significantly enhanced access to specialized high school courses through distance education supported by information technology. The critical mass of computer equipment in schools will make it feasible to support the conversion of the public school curriculum, particularly at the secondary

level, to a format which can be delivered through computers and multimedia platform.

- Teachers will be able to develop their IT related skills by having direct access to computers and Internet in their schools and through the professional development provided as part of the project. This will allow them to be able to support student acquisition of technology skills and to play a leadership role in the community in demonstrating applications of IT and supporting community access.
- All schools will be connected to the Internet and all students and teachers will have E-mail accounts.

As the result of this project, the following community development benefits will be realized.

- The public across the province will receive increased access to education and training opportunities focused on information technology skills. Schools will also be encouraged to develop partnerships with community agencies to provide multimedia computer software which can be used to support literacy and academic upgrading.
- In conjunction with the community, local businesses, particularly in rural areas, will be provided training programs to develop workers' information technology skills. Schools and the Centre for Entrepreneurship Education and Development will work with the local business community to assist businesses starting up and existing businesses to explore new uses for information technology including the Internet.
- The public will receive greatly enhanced access to government and other information and services provided through the Internet.
- The NS educational software industry will be directly stimulated by having an installed base of computers sufficiently large to justify the development and testing of new computer and Internet based educational projects for use in local schools and for export. The move to a regional curriculum with an outcomes focus will facilitate

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this and provide exciting opportunities for both developers and educators.

### Context

Technology, including information technology, makes it possible for students to interact more and more easily with a wide range of visual, aural, and print media. Appropriate integration of IT allows students to extend their capabilities and reach; to reflect on their perceptions of time and place; and to interact with each other and the world beyond the school in new ways which sustain and improve learning.

However, our pedagogy must shape and direct these IT applications if they are to assist students in achieving curriculum outcomes or fostering personal and social well-being. IT manipulation is not enough; students must also learn to evaluate resources to better extract information, make decisions about it, and so construct meaning. Also, our pedagogy must consistently provide an opportunity and a priority for students to develop and present their understandings.

The essence of learning is creating original works; accessing, gathering and managing data; investigating it; problem solving; decision making; and creating and communicating new understandings. Together with pedagogical partnerships between students and teachers, student access to a wide range of IT resources will strengthen and support the implementation of all curriculum in Nova Scotia.

As IT becomes well integrated into the curriculum, the talents and interests of students and teachers will be nurtured not only by those with whom they are in direct daily contact, but also by a broader community of fellow learners world-wide. In classrooms which effectively harness IT for learning, the transformation of the Nova Scotian learning environment has already begun.

Through education, Nova Scotian students can connect meaningfully with diverse cultures. Education provides them a greater opportunity to understand and to value the insights and accomplishments of others. Simultaneously, their reflection on their learning experiences alters their values and their understanding

of their own culture.

These effects, present in any successful learning process, are quickened and intensified by the appropriate application of educational IT.

In such a context, may we legitimately fear losing local cultures to a global uniformity? Is it true that the greater the number and variety of ideas communicated between cultures, the greater the rate of innovation? Does innovation necessarily improve our quality of life? As educators, we must seek answers to such questions—answers which are in the best interests of our students. Only through research and teacher professional development in the implementation of resource-rich curriculum will the most appropriate uses of IT develop.

Because the best electronic communication systems are designed to be locally adaptable, individuals and communities using them participate as providers of content and arbiters of their culture. Through such systems, teachers, students and Nova Scotians generally can support each other's growth and learning. Nova Scotia's Ednet, for example, acts a learning forum and gateway which makes possible peer collaborations and interactions with resources and expertise across the province and world-wide.

Such a wise use of IT is a rich learning opportunity. As students frame problems, investigate alternatives, find solutions and make decisions, they can more readily include the viewpoints of other students and experts beyond the school. Such collaborations are beyond the typical capacity of an individual teacher in a school without good access to IT. Where electronic environments clearly demonstrate such advantages, they are clearly valuable.

However, as we educators integrate current and emerging technologies within education, we must be cautious that we do not promote mere reasoning and skilled manipulation without improving quality of life. We have an ethical responsibility to see that every application of technology develops and maintains, between learners, mutual respect and responsibility. We must be concerned to develop intelligences and technical competency, but not at the expense of nurturing a positive sense of self and community. As educators, we must encourage students to evaluate

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information technologies in the light of the ethical standards of their communities and to commit themselves to an ethical use of IT.

Likewise, the use of IT should not replace direct experience of the real world wherever possible. Educators must never forget that while virtual experiences are often powerful and captivating they are ONLY mediated, indirect experiences. We must assist our students in examining their meaning critically. We must guide students towards connecting such learning experiences meaningfully to real life. All learning experiences, virtual and otherwise, should help students understand themselves, their communities and the world of which they are part.

Similarly, while information technologies are tools for change, they should not become simply tools for doing the same old thing faster and cheaper. IT should increase the volume, flexibility and depth of both collaboration between students, teachers, and their peers, and interaction with outside resources and expertise. IT communications tools should offer a rich palette of visual, linguistic, and other ways in which students can investigate ideas and represent their understandings. To the extent that it does these things, IT in education will change fundamentally decision-making and power distribution within schools, so that individual learners assume appropriate responsibility for, and control of, their learning.

Supported by skilful teachers and library staff, students in the Information Age can identify problems; define research needs; gather information and assess it; discover, understand, and apply patterns and relationships; reach original, realistic decisions; create new information; and represent their understanding to others faster and better than ever before. The "bovy of knowledge" they can access to do this continues to grow exponentially. If they are to understand the interconnections between ideas and information, yet avoid being overwhelmed by a sheer glut of data, we educators must rededicate ourselves to the development of high-order problem-solving and decision-making skills, while we model appropriate uses of technology.

When educational IT is wisely used, the pedagogical relationship between teacher and student can be rich. Teachers facilitate, mentor and coach, rather than

lecture; students evaluate, apply, and create information to define and solve problems, rather than simply recall facts. Together, they engage with diverse resources and expertise within and beyond their classrooms. In such a context, teachers can develop and use more flexible and authentic strategies of assessment to measure students' learning. In fact, assessment practices can incorporate technology itself to genuinely reflect students' understanding and performance in relation to expected learning outcomes.

As students prepare to take meaningful places in our society, educators must apply IT wisely to promote their literacy, intellectual development, and ethical growth. The result should be student self-respect; their empathy towards human diversity; their wisdom and understanding; and their commitment to life-long learning and the well-being of others.

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## **KEY-STAGE OUTCOMES for the integration of information technologies within the public school program**

**NOTE:** Key-stage outcomes are cumulative. Teachers should be familiar with outcomes at all stages to understand fully the development of any given outcome or to match student experiences and curriculum outcomes. The key-stage outcomes represent what is intended or what is expected at the end of that stage. At the end of a particular key-stage some students will have fully achieved the intended outcome while others will not. While the outcomes are intended for all students, it is acknowledged that different students will achieve these outcomes in different ways and to different depth and breadth depending on interest, ability, and context.

### **What should students be able to do and to understand as a result of their use of IT?**

Students will demonstrate expected performance levels in five IT-based learning outcome areas, within the context of essential graduation learnings and outcomes specified for the public school program as a whole.

## **Learning Outcomes Framework**

There are five components to the learning outcomes framework for the integration of IT within curriculum programs

### **1. Basic Operations and Concepts**

Concepts and skills associated with the safe, efficient operation of a range of information technologies.

### **2. Productivity Tools and Software**

The efficient selection and use of IT is to perform tasks such as

- the exploration of ideas
- data collection
- data manipulation, including the discovery of patterns and relationships
- problem solving
- the representation of learning

### **3. Communications Technology**

The use of specific, interactive technologies which support collaboration and sharing through communication.

### **4. Research, Problem Solving, and Decision Making**

The organization, reasoning, and evaluation by which students rationalize their use of IT.

### **5. Social, Ethical, and Human Issues**

That understanding associated with the use of IT which encourages in students a commitment to pursue personal and social good, particularly to build and improve their learning environments and to foster stronger relationships with their peers and others who support their learning.

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## **KEY-STAGE CURRICULUM OUTCOMES**

### **Area 1: Basic Operations & Concepts (BOC)**

Concepts and skills associated with the safe, efficient operation of a range of information technologies.

#### **By the end of grade 3**

##### **BOC 3.1**

Students will demonstrate that, with direct assistance when required, they can

- safely use school media display equipment to play video and audio resources
- safely use school computer equipment to access and navigate software programs designed for use by students at this grade level
- safely operate school communication equipment—such as an audio listening station, an overhead projector, a television, telephone, or photocopier—to support their research, communication, and learning

##### **BOC 3.2**

Students will plan and create, for a curriculum purpose, a short, unedited, original audio tape recording containing spoken words and sound effects.

##### **BOC 3.3**

With the assistance of their teachers when required, students will select information from a range of identified print, media, and electronic sources to create the following, to tell a story or report the results of their learning to an identified audience

- a word-processed document containing graphics and illustrations
- a poster and display
- an electronic publication, such as a web page or a multimedia presentation containing text, images, and sound

##### **BOC 3.4**

Students will be expected to start, re-start, and properly shut down a computer; insert and eject diskettes and CD-ROM products; open and close programs; and create, edit and save documents or other work on a local disk drive. Students are also able to log independently into local area networks and save and print files to desired peripheral devices.

##### **BOC 3.5**

With the assistance of their teachers, students will create, send, open, read, and respond to e-mail and mail attachments.

##### **BOC 3.6**

Students will demonstrate an understanding of and use basic terminology related to the IT they are using at their current grade level.

##### **BOC 3.7**

Under teacher supervision, students use IT in an ergonomically correct fashion based on currently accepted medical theory.

##### **BOC 3.8**

Students report malfunctioning equipment to their teachers.

#### **By the end of grade 6, in addition to grade 3 outcomes**

##### **BOC 6.1 (relate to 3.1)**

Students will be able to use calculators; media and computer equipment; and relevant peripheral devices, such as scanners, cameras and printers.

##### **BOC 6.2 (relate to 3.1, 3.4)**

Students will demonstrate effective use of computer keyboards, mice, and/or other input devices to produce final documents and presentations with few typographical or layout errors.

##### **BOC 6.3 (relate to 3.3)**

Students will be expected to open, read and manipulate a variety of software in several formats and to move data between applications.



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**BOC 6.4 (relate to 3.3)**

Students will be expected to identify some basic forms, structures, and styles used in particular information products and processes.

**BOC 6.5 (relate to 3.3)**

Students will be expected to launch appropriate curriculum software unaided, and to open, edit, save and close computer documents in several software formats.

**BOC 6.6 (relate to 3.4)**

Students will be expected to create and manage folders and directories of their work on local hard drives or networks. They will be expected to connect and disconnect peripherals properly and safely, and to replace paper, printer ribbons, and toner cartridges as necessary.

**BOC 6.7 (relate to 3.5)**

Under general teacher supervision, students will independently send, open, read, and respond appropriately to e-mail and mail attachments.

**BOC 6.8 (relate to 3.6)**

Students will understand and, with increasing facility, use a wide range of terminology related to the technologies they employ during their studies.

**BOC 6.9 (relate to 3.7)**

Students will begin to understand the health and efficiency reasons for using IT in an ergonomically correct fashion.

**BOC 6.10 (relate to 3.8)**

Students will report malfunctioning equipment to the teacher, but will also provide anecdotal information which may be of help to maintenance technicians.

**By the end of grade 9, in addition to grade 6 outcomes****BOC 9.1 (relate to 6.1)**

Under general supervision as they research, design and create products that represent their learning, students will be able to independently and safely

- operate a wide variety of school media equipment, including audio equipment, overhead projectors, video cameras, videocassette recorder/players, televisions, photocopiers, and still cameras;
- use computer equipment to access and use curriculum-based computer software, from CD-ROMs, hard drives, or other data storage media.

**BOC 9.2 (relate to 6.2)**

Students will demonstrate accurate, efficient keyboarding and manipulation of appropriate input devices. Students will also be able to assist other in the use of peripherals.

**BOC 9.3 (relate to 6.3)**

Using a variety of technologies, students will demonstrate an understanding of technological applications and will apply appropriate technologies to solve curriculum problems and enhance their learning.

**BOC 9.4 (relate to 6.3, 6.5)**

Students will independently run grade-appropriate software and manage folders and directories of their electronic work in accordance with school policies.

**BOC 9.5 (relate to 6.8)**

Students will understand and use an increasing range of specialized vocabulary associated with the technologies they use.

**BOC 9.6 (relate to 6.9)**

Students will practice—and demonstrate a developing understanding of—sound ergonomics as they use IT. Students will identify and report to relevant staff, dangerous work-station configurations or practices.

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**BOC 9.7 (relate to 6.10)**

Students will apply basic troubleshooting techniques in assessing equipment and software problems that affect their use of IT; then document and articulate such problems to assist technical support staff in further diagnosis.

**By the end of grade 12, in addition to primary - grade 9 outcomes****BOC 12.1 (relate to 9.1, 9.2)**

Students will demonstrate an understanding and efficient use of existing and developing information technologies for curriculum purposes.

**BOC 12.2 (relate to 9.4)**

Students will use a wide variety of technologies; demonstrate a clear understanding of technological applications; and consistently apply appropriate technologies to solve curriculum problems and enhance their learning.

**BOC 12.3 (relate to 9.5)**

Students will demonstrate facility with the specialized vocabulary of the technologies they use.

**BOC (relate to 9.6)**

Students will take personal responsibility for using information technologies in an ergonomically sound fashion and will suggest remedies for dangerous configurations or practices.

**BOC 12.5 (relate to 9.3)**

Students will independently evaluate, select, use and troubleshoot appropriate software and equipment to achieve a particular outcome.

**BOC 12.6**

Students will demonstrate an ability to assess applications of technology in the solution of problems, particularly to evaluate significant effects which estimations, program flaws and human error have on any given solution.

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**KEY-STAGE CURRICULUM OUTCOMES****Area 2: Productivity Tools & Software (PTS)**

The efficient selection and use of IT to perform work such as

- the exploration of ideas
- searching for existing information and retrieving it as necessary
- the creation of new data
- data manipulation, including the discovery of patterns and relationships
- problem solving
- the communication of learning

**By the end of grade 3****PTS 3.1**

Students will select the information media which are appropriate to the content and purpose of their own designs.

**PTS 3.2**

To communicate their learning effectively to particular audiences, students will select and use many of the following information technologies

- classroom displays, posters, and dioramas
- simple, computer-based simulation, graphics, word processing and publishing software
- simple audio cassette recorders and microphones
- fixed lens, "point-and-shoot" still cameras, either film or digital
- photocopiers and slide projectors

**PTS 3.3**

Students will identify and describe different ways in which information can be created, stored, used, presented and transmitted.



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**PTS 3.4**

With the assistance of their teachers, students will use manipulative equipment, instruments and other resources, to explore scientific, mathematical or geographic concepts under study.

**PTS 3.5**

Students will select information media which provide access to information they require for their learning. Students will also successfully search those media for relevant information.

**By the end of grade 6, in addition to the grade 3 outcomes****PTS 6.1 (relate to 3.1)**

Students will independently use a computer to create and edit images which they subsequently use to demonstrate visually their understanding of curriculum concepts.

**PTS 6.2 (relate to 3.1)**

With the collaboration of teachers and peers, students will use software to brainstorm, develop a thought web, and outline ideas under study.

**PTS 6.3 (relate to 3.1, 3.3)**

Students will create and interpret tables and graphs with graphic calculators, computer software, and visual projections.

**PTS 6.4 (relate to 3.1- 3.3)**

Having researched a topic within a curriculum unit, students will discover patterns and relationships between pieces of information, and, with the assistance of their teachers, use information technology to design and create simple databases.

**PTS 6.5 (relate to 3.3)**

Students will collaborate with others to conduct simple research, then plan and create a representation of their learning, such as a storyboard, a multimedia presentation, an audio cassette, a web page or a print publication.

**PTS 6.6 (relate to 3.3)**

Students will work independently to conduct simple research, then plan and create a representation of their

learning, such as a storyboard, a multimedia presentation, an audio cassette, a web page or a print publication.

**PTS 6.7 (relate to 3.1)**

With the assistance of their teachers, students will use video cameras, scanners, and computer-based video and sound editing software and equipment to represent their learning to particular audiences.

**PTS 6.8 (relate to 3.4)**

Students will explore numerical and geometric situations, using appropriate technology, for concept building and problem solving.

**PTS 6.9 (relate to 3.4)**

With the assistance of their teachers, students will use tools for observation, measurement and calculation to explore scientific, mathematical and geographic concepts under study.

**By the end of grade 9, in addition to primary - grade 6 outcomes****PTS 9.1 (relate to 6.2)**

Students will independently use electronic planning software to brainstorm; develop a thought web; outline and map ideas under study; and track their progress toward agreed work deadlines.

**PTS 9.2 (relate to 6.1- 6.4, 6.8)**

In the process of collecting, analysing and displaying data, students will independently create electronic charts, tables and graphs; and design, create, and manipulate spread sheets and databases.

**PTS 9.3 (relate to 6.1, 6.5- 6.8)**

With the assistance of their teachers, students will explore curriculum concepts under study using specialized software; peripheral measuring, sampling and recording equipment; and computer-based simulations.

**PTS 9.4 (relate to 6.5- 6.7)**

Students will explore the curriculum through a wide range of print and electronic forms. They will access, create and process information by means of the specialized techniques associated with the technologies

they select.

**PTS 9.5 (relate to 6.6- 6.7)**

Under the general supervision of their teachers, students will independently manipulate sound and a range of image types, using digital imaging equipment and computer-based editing, to represent their learning in a variety of ways and for particular audiences.

**PTS 9.6 (relate to 6.6)**

Independent of their teachers, students will develop multimedia presentations, based on sound principles of design, with increasing confidence and efficiency.

**PTS 9.7 (relate to 6.8, 6.9)**

Using information technology, students will explore increasingly complex numerical and geometric situations for the purpose of developing conjectures.

**By the end of grade 12, in addition to the primary - grade 9 outcomes**

**PTS 12.1 (relate to 9.2)**

In the process of collecting, analysing and displaying data, students will independently create complex electronic charts, tables and graphs; and design, create, and manipulate spread sheets and databases.

**PTS 12.2 (relate to 9.1-9.7)**

Independently and collaboratively, students will evaluate, select, and use the following to explore and represent curriculum concepts under study

- specialized software, including computer-based simulations
- peripheral measuring, sampling and recording devices, including complex calculators

**PTS 12.3 (relate to 9.1)**

Students will independently use electronic planning software to support the development and analysis of efficient, personal study and research plans.

**PTS 12.4 (relate to 9.1, 9.4- 9.6)**

Students will evaluate, select and use— independently and effectively—a range of media, and information and communication technologies, to create, edit, and publish their work.

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**KEY-STAGE CURRICULUM  
OUTCOMES**

**Area 3: Communications Technology  
(CT)**

Those specific, interactive technologies which support student and teacher collaboration and sharing through communication.

**By the end of grade 3**

**CT 3.1**

With the assistance of the teacher when required, students will use the telephone, fax, web forms and electronic mail to correspond—and collaborate—with peers and experts to research a curriculum topic and to share insights.

**CT 3.2**

Students will explore how information is created, presented, stored and transmitted in different forms for different audiences and purposes.

**CT 3.3**

With the assistance of their teachers, students will begin to select and use appropriate techniques to manipulate and transmit information when creating

- electronic documents, such as graphs and charts, multimedia presentations, word processor/desktop publishing files, web pages and databases
- audio recordings
- photographic, scanned and paint/draw images
- short video stories for particular purposes and audiences

**CT 3.4**

With the assistance of their teachers, students will create, using web authoring software, a linear-design web page which incorporates text, still images and links to other sites related to their studies.

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### **By the end of grade 6, in addition to grade 3 outcomes**

#### **CT 6.1 (relate to 3.1, 3.2)**

With the assistance of their teachers when required, students will use the Internet to send and receive e-mail for curriculum purposes; to exchange files of curriculum-related information; and to search and access curriculum materials located on the world wide web.

#### **CT 6.2 (relate to 3.1- 3.3)**

With teacher assistance and direction as required, students will use curriculum information resources available within the school, district, community and Internet.

#### **CT 6.3 (relate to 3.1, 3.2)**

Students will contribute to—and learn from—electronic list-serves designed for student curriculum use.

#### **CT 6.4 (relate to 3.2)**

With the direct supervision and assistance of their teachers, students may participate in curriculum-based, monitored, closed, electronic e-mail chat groups; and may participate in audio-video conferencing.

#### **CT 6.5 (relate to 3.2)**

Students will begin to describe how processing and transmitting information have evolved; how they continue to change; and what impacts such changes have on individuals, communities and cultures.

#### **CT 6.6 (relate to 3.2, 3.3)**

Students will use local mass media, such as newspapers, radio, television, and the Internet to convey to the general public their ideas, questions and insights on issues of concern to students.

#### **CT 6.7 (relate to 3.2, 3.3)**

Students will demonstrate their understanding of how form, standards, conventions, and methods of information transmission affect students their age.

#### **CT 6.8 (relate to 3.3)**

Students will create, process and transform information using language, conventions, and procedures associated with educational media and information technologies.

#### **CT 6.9 (relate to 3.4)**

Independently, students will create, on a topic of study, using web authoring software, a series of linked, branched, web pages which incorporate text, still and moving images, and links to external web addresses.

#### **CT 6.10 (relate to 3.3, 3.4)**

Students will understand and apply basic principles of design and style in representing their learning.

### **By the end of grade 9, in addition to primary - grade 6 outcomes**

#### **CT 9.1 (relate to 6.1., 6.3.-6.9)**

Students will represent their learning in a range of media, including print, video, audio, and multimedia, with growing confidence and competence.

#### **CT 9.2 (relate to 6.1.-6.8)**

With teacher supervision, students are able to locate and access curriculum-relevant books, journals and other print documents; media resources; and electronic files for use in all types of research.

#### **CT 9.3 (relate to 6.7, 6.8)**

As students research and study, they will manage their electronic files and correspondence efficiently.

#### **CT 9.4 (relate to 6.5, 6.7)**

Students will demonstrate their understanding of how form, standards, conventions, and methods of transmission affect their use of information and its impact on themselves and others.

#### **CT 9.5 (relate to 6.9)**

With teacher supervision, students in small groups will design and build, for peer use, intranet or Internet web sites of student-produced pages about a curriculum topic.

### **By the end of grade 12, in addition to primary - grade 9 outcomes**

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**CT 12.1 (relate to 9.1- 9.5)**

Students will apply critically their technological skills in a range of electronic, visual and print media to communicate formally and informally.

**CT 12.2 (relate to 9.1- 9.5)**

Students will design and create electronic documents to collect survey data; to publish their learning; to assist non-profit community groups; or to support an authorized, school-based entrepreneurial project.

**CT 12.3 (relate to 9.4)**

Specifically as active users of communications technology, students will discover, share and reflect upon their own and others' cultures, values and understandings as they are expressed in electronic formats.

**CT 12.4 (relate to 9.5)**

Students will use multimedia hardware and authoring software to develop non-linear, interactive presentations.

**CT 12.5**

Students will cogently assess the value of information technology to them personally, and as a potential career path, as they prepare to further their education or to enter the work force.

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**KEY-STAGE CURRICULUM  
OUTCOMES****Area 4: Research, Problem Solving, and  
Decision Making (RPSD)**

The organization, reasoning, and evaluation by students which rationalizes their appropriate use of IT in the pursuit of other curriculum outcomes.

**By the end of grade 3****RPSD 3.1**

With the assistance of their teachers and/or a teacher-librarian, students will define and use simple search strategies in identifying and locating print, video and electronic resources to meet their information needs.

**RPSD 3.2**

With the assistance of their teachers and/or a teacher librarian, students will search full-text and encyclopaedic electronic resources, as well as teacher-selected Internet web addresses specifically designed for elementary-level use, for information relevant to their needs.

**RPSD 3.3**

Students will accurately use simple measuring devices and record their findings on charts and graphs.

**RPSD 3.4**

Students will analyse charts, maps and graphs to predict patterns and relationships in information, and to support accurate decision-making.

**RPSD 3.5**

With the assistance of their teachers, students will complete short, clearly defined, secondary research tasks, assessing information selected from several sources.

**RPSD 3.6**

With the assistance of their teachers, students will complete short, clearly defined primary research tasks, such as observing a natural phenomenon, or creating a simple family biography using photographs.

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**RPSD 3.7 (relate to 3.5- 3.6)**

With the assistance of their teachers, students will record and cite information sources used in their research.

**By the end of grade 6, in addition to the grade 3 outcomes****RPSD 6.1 (relate to 3.1, 3.2)**

Students will independently locate and access school library resources relevant to their personal interests or topics under study.

**RPSD 6.2 (relate to 3.1- 3.4)**

Students will understand that well-researched solutions to curriculum problems and personally important challenges can provide security, comfort and clarity to learners when their conclusions are uncommon or unexpected.

**RPSD 6.3 (relate to 3.2)**

Using full-text and encyclopaedic electronic resources and teacher-recommended Internet web addresses, designed for use at the elementary level, students will independently search, evaluate and select relevant information on topics under study.

**RPSD 6.4 (relate to 3.5, 3.6)**

Using several information bases selected in consultation with their teachers, students will complete a research task on a curriculum topic selected and focussed with the assistance of their teachers.

**RPSD 6.5 (relate to 3.7)**

Students will record and cite sources of information used in their research.

**By the end of grade 9, in addition to grade 6 outcomes****RPSD 9.1 (relate to 6.1-6.4)**

With the assistance of their teachers, students will select appropriate measuring and recording devices and/or software to collect data, discover patterns of change over time, solve problems and make logical decisions based on their investigations.

**RPSD 9.2 (relate to 6.2)**

With the assistance of their teachers, students will select and use appropriate forms, styles, media, and sources to access, manipulate, assess and present information meaningfully for different audiences.

**RPSD 9.3 (relate to 6.2.-6.4)**

With the assistance of their teachers, students will assess the quality, completeness, biases, and perspectives of print, media and electronic resources for possible use in their curricular studies.

**RPSD 9.4 (relate to 6.2., 6.3)**

Students will independently select, use and occasionally develop specialized techniques to create communication environments, processes and products in print, media and electronic forms which meet defined information needs and appropriate quality standards.

**RPSD 9.5 (relate to 6.2.-6.4)**

Students will independently and critically evaluate how style, form, source and medium influence the accessibility, validity and meaning of information.

**RPSD 9.6 (relate to 6.2.-6.4)**

With the assistance of their teachers, students will assess the strengths and limitations of different approaches to research, then select those approaches which more efficiently meet their learning needs.

**RPSD 9.7 (relate to 6.4)**

With the assistance of their teachers, students will select and refine a research topic, according to teacher-provided criteria, to fulfill a curriculum requirement.

**RPSD 9.8 (relate to 6.5)**

Students will accurately and independently cite bibliographic information.

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**By the end of grade 12, in addition to the primary - grade 9 outcomes**

**RPSD 12.1 (relate to 9.1)**

Under the general direction of their teachers, students will select appropriate measuring and recording devices and software to collect data, solve problems, note patterns of change over time and to make logical decisions based on their investigations.

**RPSD 12.2 (relate to 9.1-9.8)**

Students will use language, in a range of aural, print, media and electronic forms

- to explore and express their perceptions, feelings, ideas and attitudes
- to refine their thinking
- to interact, negotiate and collaborate with others
- to build their understanding of the world

**RPSD 12.3 (relate to 9.3)**

Students will independently evaluate and organize ideas and information from a wide range of media and a variety of sources to meet their curriculum needs efficiently.

**RPSD 12.4 (relate to 9.5)**

Students will recognize and evaluate congruencies, discrepancies, and omissions within and among information sources.

**RPSD 12.5 (relate to 9.3)**

Students will evaluate the quality, completeness, biases, perspectives and information content of print, media and electronic resources for possible use in their curricular studies.

**RPSD 12.6 (relate to 9.2, 9.5)**

Students will evaluate, select and use appropriate forms, styles, media, and sources to access, manipulate and present information meaningfully for different audiences.

**RPSD 12.7 (relate to 9.2, 9.4, 9.5)**

Students will present research results and reports in a variety of appropriate print, media and electronic formats.

**RPSD 12.8 (relate to 9.6)**

Students will demonstrate understanding of the strengths and limitations of different approaches to research, and select only those approaches which efficiently meet their learning needs.

**RPSD 12.9 (relate to 9.7)**

Students will contribute to the development of criteria for selecting a research topic, and-based on those criteria—will define and complete a research task efficiently.

**RPSD 12.10 (relate to 9.8)**

Students will accurately record and cite, using academically accepted forms and standards, sources of information contributing to their research.



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## **KEY-STAGE CURRICULUM OUTCOMES**

### **Area 5: Social, Ethical & Human Issues (SEHI)**

That understanding associated with the use of IT which encourages in students a commitment to pursue personal and social good, particularly to build and improve their learning environments and to foster stronger relationships with their peers and others who support their learning.

#### **By the end of grade 3**

##### **SEHI 3.1**

Students will share books, other media or electronic information resources, and media and computer equipment.

##### **SEHI 3.2**

Students will demonstrate respect for the privacy and work of others when using shared information resources, or media and computer equipment.

##### **SEHI 3.3**

Students will work collaboratively with teachers to develop responsibility for their personal safety during the use of IT. They will report to their teachers communications received verbally—or in print, media and electronic formats which

- request personal, identifying information are disturbing
- initiate or request personal contact

##### **SEHI 3.4**

Students will respond personally and with developing critical awareness to a range of print, media, and electronic resources.

##### **SEHI 3.5**

Students will begin to identify the values and points of view that contribute to finished works and documents as they select print, media and electronic resources for possible use.

##### **SEHI 3.6**

Students will demonstrate knowledge of and comply with school Internet access and use policy.

##### **SEHI 3.7**

Students will obtain appropriate permission when they wish to include copyrighted data, text, sound or images in their research and presentations.

#### **By the end of grade 6, in addition to grade 3 outcomes**

##### **SEHI 6.1 (relate to 3.1, 3.2)**

During independent and collaborative study, students will demonstrate respect for the privacy and work of others, and share information resources, media equipment and computer equipment.

##### **SEHI 6.2 (relate to 3.3)**

With the assistance of their teachers as required, students will begin to identify social and ethical issues concerning

- the accuracy of information and its representation
- personal privacy and safety when in electronic environments such as Internet
- global access to information and its manner of distribution

##### **SEHI 6.3 (relate to 3.4)**

With the assistance of their teachers as required, students will begin to evaluate how information networks and media productions—such as Internet, audio and video recordings, multimedia presentations, and print publications—influence the form and structure of information and its impact on themselves, on communities, and on virtual and natural environments.

##### **SEHI 6.4 (relate to 3.5)**

Students will explain and demonstrate how form and structure in information products and processes are influenced by particular cultural values and experiences.



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**SEHI 6.5**

Students will demonstrate an understanding of the social conventions of on-line communication and observe these conventions during their own communications on the Internet.

**By the end of grade 9, in addition to primary - grade 6 outcomes****SEHI 9.1 (relate to 6.1- 6.4)**

Students will demonstrate understanding of the nature of technology and its impacts on different societies and environments. Students will assume personal responsibility for ethical behaviour and attitudes with regard to information technologies and resources. They will use them—in local and global contexts, with due regard for the legal and human rights of others.

**SEHI 9.2 (relate to 6.2)**

Students will demonstrate understanding of model,—and assume personal responsibility for—the acceptable use of copyrighted information resources.

**SEHI 9.3 (relate to 6.3)**

Students will identify and demonstrate the techniques of mass media, popular culture and electronic information environments, and evaluate the effects of these techniques.

**SEHI 9.4 (relate to 6.4)**

Students will identify the values which inform mass media, popular culture and electronic information environments in relation to their personal values.

**SEHI 9.5 (relate to 6.4)**

With the assistance of their teachers as required, students will identify the impacts of various media and information technologies on them, their learning environment, their cultures, and society.

**SEHI 9.6**

As researchers, students will demonstrate an understanding of, and a commitment to, accuracy and ethical behaviour as they create and distribute information about themselves, others and curriculum topics under study.

**SEHI 9.7**

Students will identify technology-related career opportunities of personal interest, and begin to assess their strengths and interests with respect to technology.

**By the end of grade 12, in addition to the primary - grade 9 outcomes****SEHI 12.1 ( compare 9.1, 9.5)**

Students will critically analyse the impact of various media and information technologies on themselves, the learning environment, culture, and society.

**SEHI 12.2 (relate to 9.1, 9.2, 9.6)**

As researchers, students will demonstrate an understanding of—and a consistent commitment to—accuracy and ethical behaviour as they generate and distribute knowledge about themselves, others and curriculum topics under study.

**SEHI 12.3 (relate to 9.3)**

Students will articulate an informed and critical understanding of mass media, popular culture and electronic information environments; their techniques; and the effects of those techniques.

**SEHI 12.4 (relate to 9.3-9.5)**

Students demonstrate control of their relationship with print, media and information technologies and products for personal and social benefit.

**SEHI 12.5 (relate to 9.1- 9.6)**

Students will articulate an informed and critical analysis of the personal, societal, and environmental impacts of technology past and present.

**SEHI 12.6 (relate to 9.4-9.6)**

Students will demonstrate habits of perception, analysis, judgment and selectivity as they contribute to society through the discerning and critical use and creation of information resources and technologies.

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**SEHI 12.7 (relate to 9.4-9.6)**

Students will demonstrate through informed action a sophisticated understanding, from a number of perspectives and value sets, of ethical issues related to information technologies used for learning in local and global contexts.

**SEHI 12.8 (relate to 9.5, 9.6)**

Students will demonstrate ethical behaviour in the use of information technologies, media and electronic information resources.

**SEHI 12.9 (relate to 9.7)**

Students will demonstrate an appreciation of the role of technology-related careers in the larger community and will assess technology-related career opportunities within the context of their personal values and needs.

**Illustrative Examples of Key-Stage Outcomes**

A separate document contains illustrative examples of key-stage outcomes.

An illustrative example is a brief story from teaching and learning which reveals how students accomplish key-stage learning outcomes. They assist teachers in finding natural and realistic ways to integrate information technologies successfully and significantly with the curriculum. They also demonstrate what acceptable and superior accomplishments of an outcome "look like."

Rather than attempting to explain each outcome definitively, illustrative examples present significant tasks, experiences and pedagogy. Their intent is to support teachers and students as they plan or experience learning events which integrate IT within the curriculum. In addition, illustrative examples may assist parents and the community in understanding expectations for student learning.

The latest update is available on the Internet at:

<http://lrt.ednet.ns.ca>

Printed copies are available in limited quantities:

**Learning Resources and Technology**

3770 Kempt Road

Halifax, NS, B3K 4X8

(902)424-2462 or fax (902)424-0633